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CITY OF TORONTO
PLANNING AND DEVELOPMENT DEPARTMENT

334/02170
Policy
January 20, 1983.

To: City Services Committee

Subject: Joint Metro/TTC "Accelerated Rapid Transit Study" (ARTS) Report: Final Comments

Origin: Metropolitan Economic Development and Planning Committee at its meeting of June 16, 1982 (c71csc83001:44)

Comments:

Summary

INTRODUCTION

This report comments upon the recommendations of the joint Metro/TTC "Accelerated Rapid Transit Study" (ARTS) and extends the work of my September 1982 interim report on this subject. The ARTS study was released in June, 1982 with the major recommendation that two rapid transit lines be approved in principle:

1.) Sheppard Avenue Line - a suburban, east-west rapid transit line connecting the North York and Scarborough Town Centres ($420 m. cost).

2.) Downtown "Relief" line - from Donlands Station on the Danforth Subway to Union Station, to provide relief to crowding on the Yonge line south of Bloor Street ($380 m. cost).

Since the publication of these recommendations other events have added to the debate.

RECENT EVENTS

- October 1982, the Provincial Government announces a staged, development strategy for the expansion of GO-services:

  - extend current Lakeshore Services east and west to Hamilton and Oshawa;

  - build new, circumferential route across North Metro, incorporating the ARTS Sheppard Avenue line proposal; and

  - pursue improvements to existing Lakeshore GO-rail (Oakville - Pickering) services and study long-term

possibility of developing a separate, electrified rail system over this section of route.

- November 1982, the TTC receives IBI consultant study on surface transit priority measures which points out the cost effectiveness of these measures compared to rapid transit investments.

- November 1982, the TTC proposes its five year (1983-87) capital works program which accorded priority to a combined "Waterfront and East Downtown Radial" rapid transit line over the Sheppard Avenue line. Total cost of both lines estimated to be $1,564 m.

- December 1982, the TTC presents its "1982 Long Range Plan" which states that surface transit improvements can only provide stop-gap relief to the Central Area and early approval of the ARTS "relief" line required.

- December 1982, the TTC produces report on "Central Area Surface and Subway Transit Improvements", which again states that surface transit improvements are only an interim solution and recommends approval in principle of the relief line. The TTC found that modest capacity increases (3,000 to 4,000 passengers/hr.) could be achieved on the Yonge subway by reducing existing headways (time between trains) from 130 to 120 seconds. A capacity increase of 10,500 passengers/hr. on the Yonge line could be achieved if headways are reduced to 100 second intervals, but going below the two minute level involves substantial capital plant improvements (cost $150m - $230m) and vehicle costs.

PATTERN OF TRIP GROWTH

The conclusions of the present report are based on the following analysis:

- The Destination End (employment):

  - Central Area employment and trip growth predicted on the basis of an average (1976-82), annual rate of 160,000 sq.m of additional office space occupied ("absorbed") each year.

  - at this rate of absorption, the office floor space limit originally proposed in the Central Area Plan on the basis of the capacity of the existing (1976) transportation system is marginally exceeded by 1991.

- as a consequence, some form of transit improvements will be required to accommodate future Central Area employment growth: the current debate is over the form of these improvements.

. The Origin End (population):

- 1979-1991 population growth projected as follows:

  Metro : increase 41,000 (or 2%), mainly Scarborough, North Yonge and Waterfront

  Regions : increase 430,000 (or 53%), mainly in Peel and York Regions

- Consequently, only 9% of 1979-91 regional population growth expected to occur in Metro.

. The Pattern : Origins and Destinations:

- pattern of land use development suggests a continuing growth in long-distance commuting into the Central Area.

- long-term growth expected particularly from west and north in Peel and York Regions and may be increasingly beyond the range of TTC services.

- relief line appears of little relevance to the emerging, long-term, regional commuting problem.

- appears to be sufficient, planned GO-transit capacity to accommodate regional commuting growth to the Central Area to around the mid 1990's.

THE RELIEF LINE AND ITS ALTERNATIVES

. The relief line proposed in ARTS has some drawbacks:

- expensive ($51 m/km, plus vehicle costs);

- off-peak ridership minimal;

- single downtown focus on Union Station;

- leads to reduced use of Danforth subway west of Donlands Station; and

- not related to emerging pattern of long-term, regional trip growth.

- The relief line only makes sense as a part of a longer, east radial line extending north of Danforth Avenue, perhaps all the way to Finch Avenue. Such a radial line is a possible long-term option to a potential future regional commuting problem. In looking at the problem of providing short-term relief to the Yonge subway south of Bloor, which is the issue now facing the T.T.C., surface transit improvements appear to offer a more cost-effective relief function.

- Proposals for the introduction of a Sherbourne Express bus (Castle Frank to the Downtown) and a Spadina Light Rapid Transit (LRT) service (Bloor Subway to the Waterfront) are already being studied. This report recommends, in addition, the study of a Bay Street LRT service from Bloor Street to the Waterfront. This proposal would include looking at the possibility of running the LRT under Bloor Street and directly into the Bay Subway Station and the possible one-way, southbound operation of Bay Street from Queen to Wellington Streets with a contra-flow transit lane. Such a Bay LRT service might be implemented for a cost of around $100 m. dollars and would appear, at this stage of analysis, to offer several advantages over the ARTS relief line proposal, namely:

  - a quarter of the cost of the relief line;
  - serves development areas both north and south of Front;
  - attracts riders from both the Bloor and Danforth subway lines;
  - better off-peak usage;
  - makes full use of existing subway capacity into the Central Area;
  - develops an existing surface transit route with an already established relief function.

- A combination of the Spadina LRT, Bay LRT and Sherbourne Express bus proposals appears to provide sufficient "relief" capacity to the Yonge line south of Bloor Street to accommodate the growth in TTC trips to the Central Area to around the year 1995 (on the basis of an annual, office space absorption rate of 160,000 sq. m a year).

- In the long-term (post 1995) a regional commuting problem may arise which produces capacity problems on the Yonge subway north of Bloor Street. Currently, there appear to be three possible alternatives for coping with this possible eventuality;

- look to expanded GO-services to solve the reigonal problem;

- increase capacity on the Yonge-University-Spadina subway by undertaking substantial capital improvements to reduce headways below 2 minutes.

- invest in a Metro radial (not relief) line.

. Which to choose among these three long-term options, if problems arise on the Yonge line north of Bloor, is not a decision that should be made now. In the meantime, a better understanding of the transit problems that are likely to be confronted in the 1990's can be gained without the loss of any current options for long-term solutions.

POLICY CONSIDERATIONS

. The ARTS relief line proposal, if implemented, would require an amendment to the Metropolitan Official Plan to which, in turn, the City's Official Plan is legally required to conform.

. Approval of the proposed relief line would reduce funds available for suburban transit line proposals, such as the Sheppard Avenue line, that encourage the development of the planned, employment sub-centres.

. Building a new, rapid transit line into the Central Area could, at this stage, detract from the policy objective of deconcentration.

CONCLUSIONS

. Surface transit improvements provide the most cost-effective means of providing relief to the Yonge subway south of Bloor Street and accommodating the growth of TTC trips to the Central Area and Waterfront.

. This report suggests a package of surface transit improvements based upon the introduction of the Sherbourne Express bus, Spadina LRT and Bay LRT services.

. The Bay LRT is a new proposal requiring further study.

. The surface transit package proposed above provides the potential for sufficient additional capacity to accommodate Central Area and Waterfront employment growth to about the year 1995.

- The surface transit package does not remove any current options for long-term solutions.

- In the long term (post 1995) a regional commuting problem may arise, which is largely beyond the range of TTC services, but this issue is best addressed at a later stage in the light of further study and experience.

- In view of the above, it is not recommended that the relief line, as proposed in the ARTS Study, be approved. However, the radial line, of which the relief line is a part, should be studied further as a possible long-term solution, if needed, to the anticipated regional commuting problem.

- The possibilities of reducing headways on the Yonge-University-Spadina subway below 2 minutes and expanded GO-transit services should also be studied further as possible long term solutions to the regional problem.

- The surface transit improvements recommended in this report are consistent with both the Metropolitan and City Official Plans and enable transit funds to be made available for suburban transit line proposals that directly support the policy of deconcentration.

1. BACKGROUND

1.1 Administrative History

In considering my September 3, 1982, interim report on the Joint Metro/TTC "Accelerated Rapid Transit Study" (ARTS) report, City Council, at its meeting of September 23, 1982, adopted the recommendation that further consideration of this matter be deferred:

> "... until the recommended TTC studies on surface transit improvements in the Central Area and the feasibility of increasing the capacity of the existing subway system are completed and have been reviewed by City staff."

The TTC studies referred to above did not become available until mid-December 1982 and, in the meantime, the City Services Committee at its meeting of December 15, 1982, adopted the recommendation of my December 3, 1982, status report requesting the Metro Economic Development and Planning Committee to extend its original December 30, 1982, deadline for comments on the ARTS report into the new year. The City Services Committee added the further request that my final report be submitted by the time of its January 25, 1983, meeting. This report is submitted in response to that request and should be read in conjunction with my interim report of September, 1982.

1.2 Introduction to the Issues

The Metro/TTC ARTS report recommends that "approval in principle" be given to two new rapid transit lines in Metropolitan Toronto:

a) Sheppard Line - a suburban, east-west line along Sheppard Avenue to connect the North Yonge and Scarborough Town Centres in support of the strategic, land use planning objective of deconcentration (estimated capital cost of $420 million in 1982 dollars); and

b) Downtown "Relief" Line - a centrally oriented transit facility, running between Donlands and Union Stations, proposed for operational reasons to provide additional transit capacity south of Bloor Street to ease anticipated future crowding on the Yonge subway during rush hours (estimated capital cost of $380 million in 1982 dollars).

The ARTS report made no conclusion as to which of the two lines is of higher priority. An ICTS technology was assumed for cost comparison purposes only and, apart from the requirement that both

lines operate on exclusive right-of-ways, the impression is given that the choice of fixed rail technology remains open at this stage.

Basing the relief line proposal on operational grounds, as the solution to the anticipated capacity problem on the Yonge line, implies it should be evaluated in a "cost-effectiveness" framework. That is to say, it should be shown to be the cheapest, most effective solution to the problem when compared to all other alternatives. It is in this context that the recommended TTC studies on surface transit improvements in the Central Area and the feasibility of increasing the capacity of the existing subway system are important, since those two strategies essentially represent the alternatives to the relief line proposal.

In my September, 1982, interim report, I agreed with the conclusions of the ARTS report on a number of important issues:

a) the Yonge subway line south of Bloor and the Bloor/Yonge Station experience serious crowding at certain times of the year during the rush hours and Central Area employment growth will aggravate this situation unless corrective action is undertaken;

b) the 1979-91 projection of a 60,000 employment growth in the Central Area assumed by the ARTS study is possible;

c) an east-west rapid transit line through the Waterfront from Union Station to the Exhibition Grounds is of little help on its own in solving the anticipated Central Area transit capacity problems, and such a line needs to be linked into north-south transit capacity improvements to relieve the Yonge line; and

d) existing land use policies will result in significant increases in regional commuting across the Metro boundary into the Central Area raising problems for both the GO commuter services and the regional road system, as well as for TTC services within the Metro area.

However, against the background of this list of commonly agreed upon factors, my September 1982 report raised several questions regarding the efficacy of the ARTS relief line proposal on both operational and policy grounds. The more important concerns raised are:

i) the extent to which spare capacity on the University subway can provide future relief to crowding conditions on the Yonge line over the 1979-91 period;

ii) the extent to which more incremental and less capital intensive improvements to Central Area surface transit services can provide a relief service to the Yonge line;

iii) the possibility of increasing the frequency of service on the Yonge subway line to provide a direct solution to the projected capacity problem;

iv) the cost-effectiveness of the relief line proposed in relation to the three alternatives outlined above; and

v) the land use implications, regarding the policy of deconcentration, of giving priority to the centrally-oriented relief line proposal.

In addressing the questions listed above, this report extends the work of my interim report on the projected pattern and volume of 1991 Central Area peak-hour travel demands and takes into account certain recent developments that have occurred since September 1982.

2. RECENT EVENTS

2.1 Provincial Announcements Regarding the Development of the GO System

On October 7, 1982, the Provincial Minister of Transportation and Communications announced plans for the future development of the regional GO commuter system. The announcement described a four-stage strategy:

a) begin, as first priority, to extend the Lakeshore GO-rail services east and west to Oshawa and Hamilton;

b) build an east-west GO-rail line north of Highway 401 in an arc from Oakville to Pickering and incorporating the Sheppard Avenue component of the ARTS recommendations;

c) pursue on-going, short-term improvements to the existing Lakeshore GO-rail (Oakville-Pickering) services; and

d) study the long-term possibility of securing an exclusive right-of-way for Lakeshore GO-rail services (Oakville-Pickering) to develop a separate, electrified rail system of greatly increased passenger-carrying capacity.

The new facilities proposed in the above plan are shown on Figure 1. The proposed GO-rail line north of Highway 401 along Sheppard Avenue has raised doubt regarding the ARTS proposal for a TTC rapid transit line along this same route. Concern over this

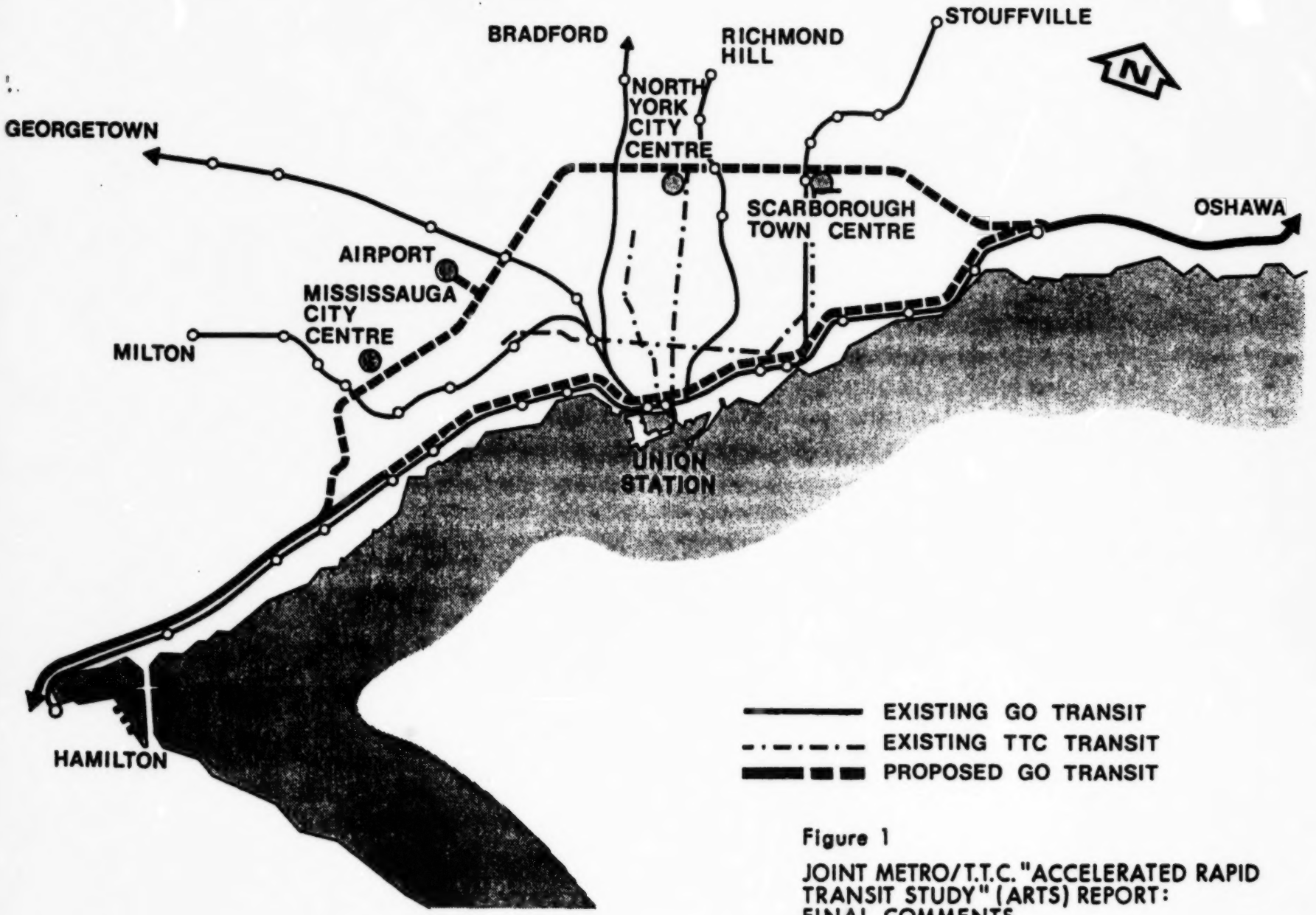

Figure 1

JOINT METRO/T.T.C. "ACCELERATED RAPID TRANSIT STUDY" (ARTS) REPORT: FINAL COMMENTS

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matter is reflected in the Borough of Scarborough's December 10, 1982, staff report on the ARTS and Provincial proposals. This report aptly comments on page 7 that studies will have to be undertaken "... to determine whether the connection between the Scarborough Town Centre and the North York City Centre will involve both the TTC and GO transit service or one or the other".

The proposal for a separate electrified track for Lakeshore GO-rail services between Oakville and Pickering is considered as both very long-term and very expensive. However, if completed, this new line would greatly add to the capacity to accommodate regional commuter travel into the Central Area.

2.2 TTC Funded Study on Surface Transit Priority Measures

At its meeting of November 30, 1982, the TTC received a report which it had commissioned the IBI Group of consultants to undertake entitled "Reserved Transit Vehicle Lanes and Other Transit Priority Measures" (July, 1982). This study concluded that "... the cost of implementation and operation of transit priority measures were found to be relatively low, particularly when compared with the capital investment that might be required to provide equivalent improvements in capacity or service levels" (p.iii). The IBI study specifically looked at measures to relieve the capacity problems of the Yonge subway and recommended further study of the following options:

a) the possible implementation of express bus routes into the Central Area from Castle Frank or Sherbourne Stations (currently under discussion);

b) making the King and/or Dundas streetcar routes from Broadview Station express to downtown, supplemented by local bus services; and

c) the implementation of reserved bus lanes on Bay Street.

2.3 TTC Five-Year Capital Works Programme 1983-1987

In a report to the Commission meeting of November 30, 1982, TTC staff appeared to pre-empt the discussion of the ARTS report by recommending the adoption of a five-year capital works programme which included $235 m. in expenditures on a combined "Waterfront and East Downtown Radial" line and $56 m. in expenditures on a "Sheppard Line East" facility over the 1983-7 period. The gross estimated cost of these two lines is budgeted by the TTC at $1,564 m.

The pattern of expenditures outlined in the TTC capital works programme implies that priority be given to the relief line over

the Sheppard Avenue line. The TTC staff also assume that the Waterfront and Radial connection to the Bloor/Danforth line (i.e. relief line) will both be financed under the Province's Board of Industrial Leadership Development (BILD) programme where 90% of costs are paid by the Province and only 10% by Metro. It seems surprising, given that part of the terms of reference of the joint Metro/TTC ARTS study were "... to consider and review specific transit improvements for possible inclusion in the TTC Capital Works Program", that the TTC staff should, at this stage, come out on its own to declare the need for and priority of the relief line proposal. In this regard it should be kept in mind that comments on the ARTS study recommendations are still being sought from the area municipalities and other affected parties.

2.4 TTC 1982 Long Range Plan

At a press conference held on December 15, 1982, TTC staff presented the "1982 Long Range Plan" report which was subsequently received by the Commission at its meeting of December 16, 1982, and circulated to relevant interest groups with the intention of producing a final revised version of the report for approval in early 1983. Work on this first TTC long range plan began in early 1981 and included thirteen background studies, eight of which were undertaken by outside consultants. In a December 9, 1982, covering report attached to the "1982 Long Range Plan", it is observed:

> "while the ARTS rapid transit study, co-ordinated by Metro Planning and issued in June of this year, was not officially one of the Long Range Plan background studies, the issues raised as the result of that study are obviously an integral part of the TTC's long range planning" (p.2).

The TTC's "1982 Long Range Plan" includes two recommendations which are of particular relevance to the ARTS study. These are:

> ". From the perspective of the TTC's operational requirements, the first rapid transit priority is a downtown "relief line" as recommended in the recent Metro/TTC Rapid Transit Study. Consequently, this line should be given early approval by Metro and the area municipalities and a detailed feasibility study initiated.
>
> . An east-west rapid transit line to support the multi-centred urban structure

> outlined in the Metropolitan Official Plan should be pursued" (p.80).

These recommendations confirm the priority attached to the relief line proposal by the TTC in its 1983-87 Capital Works Programme.

2.5 Central Area Surface and Subway Improvements

Recommendation three of the ARTS study, which was adopted by the Metro Economic Development and Planning Committee, states:

> "3. the Toronto Transit Commission be:
>
> a) authorized to prepare a plan for the implementation of surface transit to and within the Central Area, such plan to identify any required transit priority measures, and
>
> b) requested to report on the feasibility of implementing various measures to increase the capacity of the existing subway system."

The TTC's staff response to this recommendation can be found in a very brief December 8, 1982, report entitled "Interim Surface Transit Plan/Yonge-University-Spadina Increased Capacity Study Findings and Conclusions" which came before the Commission at its meeting of December 16, 1982. As pointed out above, this report essentially deals, from the TTC's perspective, with the alternatives to the relief line proposal.

Basically, the TTC report concludes that reducing headways on the Yonge-University-Spadina (Y-U-S) lines is not cost effective in comparison to the relief line proposal. Surface transit solutions are judged to offer some potential provided there is a strong commitment to the introduction of transit priority measures on downtown roads. However, they only provide interim relief to the Yonge subway and, consequently, the relief line is still needed. As a result, the major recommendation of this report is the request to:

> "Approve in principle the need for a rapid transit relief line into the Central Area, and authorize Commission staff to work jointly with Metro staff on the feasibility study for such a line."

The conclusions and recommendations of this report, which are central to the discussion of the desirability of the proposed relief line, are discussed more fully below.

3. THE VOLUME AND PATTERN OF CENTRAL AREA TRIP GROWTH

3.1 Trip Destinations: Employment Growth in the Central Area

The rate of growth in the amount of occupied office floor space in the Central Area provides an indirect measure of the rate of employment growth in this area. Consequently, the office absorption rate largely determines the rate at which transportation capacity into the Central Area is utilized and the point in time at which major improvements to the transportation system will be needed.

My staff have been collecting reliable Central Area office construction and occupancy data since 1976 when the current Central Area Plan policies came into effect. Data for the 1976-82 period indicate that there is more variation in the annual rates of office construction than absorption and this, in turn, is reflected in variations in the office vacancy rate. Between January, 1976, and January, 1982, 698 000 sq. m (7.5 m. sq. ft.) of office space have been built in the Central Area. However, over this period the office vacancy rate has declined from 8.9% to 1.8% and the amount of occupied floor space has increased by 988 000 sq. m (10.6 m. sq. ft.). Thus, for the six-year period 1976-82, the average annual rate of office construction has been 116 300 sq. m (1.25 m. sq. ft.) of office space while the annual absorption rate has been 164 000 sq. m (1.77 m. sq. ft.). This result has been achieved by reducing the supply of vacant office space in the Central Area, which in 1976 stood at 379 000 sq. m (4.1 m. sq. ft.), by 290 000 sq. m (3.1 m. sq. ft.) to 89 000 sq. m (1.0 m. sq. ft.) of vacant office space in January 1982.

With the current resurgence of Central Area office space development, it appears that a new period is being entered when office construction will outstrip absorption, the vacancy rate will rise and the stock of vacant office space will increase. In January 1982, there were 638 100 sq. m (6.9 m. sq. ft.) of office space under construction in the Central Area.

For the purpose of analyzing 1991 Central Area travel demands, it appears reasonable to plan around the rate of employment growth implied by the average annual absorption rate of office space experienced over the 1976-82 period. In rounded terms, this figure is taken as approximately 160 000 sq. m (1.72 m. sq. ft.) of additional occupied office space a year in the Central Area. This figure, which is based on the experience of the past six years, is thought to provide a reasonable basis for travel

projections into the mid-1990's. Of course, if land use policies were to change significantly in the next few years, then the appropriateness of the absorption rate figure would need to be re-assessed.

Over the nine-year period 1982-1991 an average absorption rate of 160 000 sq. m would result in a 1 440 000 sq. m (15.5 m. sq. ft.) increase in occupied Central Area office space and raise the total office stock to approximately 6 628 000 sq. m (71.3 m. sq. ft.) assuming an overall vacancy rate of around 5%. This rate of floor space growth would be sufficient to accommodate the 1979-91 60,000 employment increase assumed in the ARTS study and would bring the level of office development above the 6 549 000 sq. m (70.5 m. sq. ft.) floor space limit estimated in the Central Area Plan on the basis of the original "realistic" estimate of transportation capacity made by the consultant Parkinson at the time of the Plan's inception. With this rate of office development, increased transit capacity serving the Central Area will be required in the short-term. The present debate is over the form of this capacity increase.

3.2 Trip Origins: Population Growth in Metro and the Regions

Future predictions are for limited population growth in the Metropolitan area. The ARTS report estimated a 41,000 or 2% increase in Metro's population over the 1979-91 period. By contrast, the population of the surrounding regions is expected to increase by 430,000 or 53% over the same period. In other words, only 9% of regional population growth will occur in Metro over the 1979-91 period and this figure will likely diminish further in the long-term beyond 1991.

Of the limited Metro population growth, the TTC's "1982 Long Range Plan" report estimates that most will occur in Scarborough, the Central Waterfront and the North Yonge corridor. Most of the regional population growth is expected to occur to the west and north in Halton, Peel and York Regions. The TTC regards the new residential development in Peel as being largely beyond the TTC catchment area, though much of the new development in York will be concentrated immediately north of the Metro boundary.

The "1982 Long Range Plan" indicates that the most probable ridership trends call for about 450 million annual TTC trips by 1991, a total growth of about 15% over 1981. With an expected 15% increase in total ridership matched against a 2% increase in Metro population growth, it is not surprising to learn that almost half the total increase in TTC ridership over the 1981-1991 period is attributed to riders who are non-Metro residents.

3.3 Future Trip Patterns: Origins and Destinations Compared

The pattern of land-use development described above clearly implies a continuing growth in long-distance commuting into the Central Area. Increasingly, future transportation problems will be of a regional rather than Metropolitan nature. In this context, the potential role of the relief line appears limited. The success of this line depends upon its ability to attract current and future riders off the Danforth subway at Donlands Station and to transfer them directly down to the Union Station area, thereby reducing transfer movements at the congested Bloor/Yonge Station and reducing passenger loads on the crowded section of the Yonge line south of Bloor. Growth on the Danforth line, which feeds the relief line will, in turn, be largely dependent upon population growth in Scarborough. Accepting that only a relatively small component of long-term, regional population growth will occur in north-east Metro, the relief line can only be expected to play a limited role in solving future Central Area transit capacity problems.

In fact, it can be anticipated that even in the short-term, ridership growth will be greater on the Yonge and Bloor components of the subway system than on the Danforth line as pressures from the population growth areas to the north and west become more pronounced. In the longer term, as this trend in regional commuting from the north and west continues, the Yonge line north of Bloor may reach capacity and the relief line will be of no service in alleviating this problem. Thus, the relief function of the Donlands-Union Station line provides a relatively short-term measure which is limited by its dependency on the Danforth line for ridership growth and which by itself is of no direct relevance to the emerging, long-term, regional commuting problem.

The growth in Central Area work trips from York and Peel Regions will require an increasing shift from automobile travel to GO-transit if capacity problems on the roads, particularly the Gardiner/Lakeshore corridor, are to be avoided. At present, there appears to be sufficient planned capacity on the GO-system to accommodate increases in ridership well into the 1990's. However, large-scale development of the Waterfront area, particularly the Railway Lands, will require some additions to the capacity of the road system. This matter is being examined and will be reported on as part of the Railway Lands study process which is currently underway.

4. THE RELIEF LINE PROPOSAL

The relief line will essentially function as a peak-period, shuttle service over an approximately 6.8 km route between Donlands Station on the Danforth subway line and Union Station in the downtown. The ARTS study projects that by 1991 this line could be handling rush-hour volumes of 6,500 passengers. The cost

of the line to accommodate this volume of trips is estimated to be $380 m. (1982) of which about $344 m. appears to be for fixed costs and $36 m. for rolling stock.

In reviewing the relief line proposal in economic and operational terms, the following factors appear important:

1) it is an expensive facility ($51 m./km, plus vehicle costs);

2) off-peak ridership will be minimal;

3) the single focus of Union Station limits the effectiveness of the line to servicing the area around Union Station;

4) the introduction of the relief line will lead to the under-utilization of the capacity of the Danforth subway between Donlands and Bloor/Yonge Stations with little opportunity to reduce subway service and costs given the continued need to accommodate ridership growth on the Bloor line and the Danforth line east of Donlands; and

5) as discussed at some length in Section 3.3 of this report, the long-term role of the relief line appears limited given that there will be substantial future trip growth from York and Peel Regions to the north and west of Metro.

5. OTHER ALTERNATIVES

5.1 The Yonge Subway Relief Problem

Less capital intensive improvements to the surface transit system serving the Central Area can probably provide a more cost effective "relief" function to the Yonge subway south of Bloor Street than the Donlands-Union Station rapid transit line proposal. The TTC's December 1982 report on surface transit improvements evaluated three proposals:

1) Sherbourne express bus to Downtown from Castle Frank Station;

2) Broadview/King LRT Service to Downtown from Broadview Station; and

3) Parliament LRT service to Downtown from Castle Frank Station.

The TTC estimated that by 1991 these services would need to provide relief capacity to the Yonge line in the range of 3,000-8,000 peak-hour passengers (c.f. the ARTS report 7,000-10,000 estimate). The TTC concluded that the Parliament LRT proposal is preferred to the Broadview LRT scheme and that the Sherbourne

express bus and the Parliament LRT could provide a staged surface transit plan as follows:

a) Sherbourne Express Bus (first stage)

- 2,000 capacity increase with minimal priority;
- 5,400 capacity increase with articulated buses at one-minute intervals plus full transit priority (i.e. reserved lanes and signal pre-emption);
- low cost option ($2.5 to $12.5 m. for additional buses; $3 m. Castle Frank Station improvements).

b) Parliament LRT (second stage, replacement service)

- 8,000 capacity increase requiring one lane of roadway plus full signal pre-emption;
- estimated cost $70 - $80 m.

Although the phased additions to capacity provided by these two services would seem adequate to fulfill the necessary relief function, the TTC report concludes that "... after 1991, rapid transit will be the only solution to the downtown". In this light, the surface measures are regarded only as a stop-gap solution and "... major capital expenditures would be difficult to justify since they could be rendered redundant when the necessary rapid transit line is built" (p.6). Consequently, the TTC report recommends that only the relatively inexpensive Sherbourne Express bus surface transit relief function be pursued and the rapid transit relief line be approved in principle as the solution to congestion on the Yonge subway south of Bloor Street.

The TTC position seems to take a less optimistic view of surface transit improvements than that given in the IBI report (see Section 2.3) on transit priority measures which the Commission funded. Neither does the TTC report look at the Bay Street route which their consultants, IBI, recommended for further study as a relief measure to the Yonge subway south of Bloor.

A Bay Street LRT seems to offer considerable potential in providing a relief function to the Yonge subway. To develop an effective LRT service on this route would require a reserved transit right-of-way (6 m or 20 ft. of roadway) between intersections and pre-emptive treatment at traffic signals. At present Bay Street functions primarily as a collector/distributor providing vehicular access to adjacent developments. The introduction of an LRT Service could create conflicts with this function depending on the scale of transit demand. However, LRT

Service would replace the existing trolley coaches and, through the careful control of turning movements, it is felt that Bay Street could continue to effectively accommodate both transit and other vehicular traffic. Further detailed study will be needed to confirm this impression and to establish that an adequate transit service can be achieved at a reasonable cost.

Included in such further study would be the possibility of running the LRT underground from the Bay/Charles Street area northwards. This would enable transit vehicles to avoid the congested Bay/Bloor intersection and, by providing a direct, underground connection into the Bay Subway Station, would offer improved passenger transfer facilities and better turn-around facilities for transit vehicles at the north end of the route. The possibility of converting Bay Street to one-way southbound operation between Queen and Wellington Streets with a contra-flow transit lane, as recommended in the Central Area Traffic Management Study, should also be looked at as a possible means of improving transit service over this critical section of the Bay Street route. Preliminary estimates suggest that this type of Bay LRT service might be achievable at a cost of around $100 m. (1982) and provide an hourly capacity of 8,000 to 10,000 passengers.

The location of the Bay Street route offers a number of advantages. It is an already heavily used and well established surface transit route which is fed from both the Bloor and Danforth subway lines. For its entire length, the route travels along the spine of Downtown development and provides connections to Union Station and the proposed east-west transit lines along Queen's Quay and through the Railway Lands. The Bay Street route places capacity where it is needed and is able to service development growth both north and south of Front Street. The IBI transit priority report estimates that a Bay Street express bus could attract 4,100 existing users from the Yonge line. With the improved level of service provided by an LRT service it is felt that this figure would be even higher.

It should also be recalled that a proposal to introduce a Spadina LRT is also being studied as part of a plan to service development in the west end of the Railway Lands and Central Waterfront areas. Preliminary discussions regarding the development of the western end of the Railway Lands have emphasized the need to rebuild the Spadina road bridge to accommodate the introduction of an LRT service over the rail tracks and into the Waterfront area. This combination of the Spadina LRT, Bay LRT and Sherbourne Express bus appears to provide sufficient capacity to accommodate Central Area employment growth to around the year 1995, given the assumption (See Section 3.1) of an annual office floor space absorption rate of 160,000 sq. m a year.

In comparison to the relief line, the Bay LRT appears to offer a number of advantages:

a) approximately one-quarter of the estimated cost of the ARTS relief line;

b) better off-peak usage;

c) serves the development areas both north and south of Front;

d) attracts riders from both the Bloor and Danforth subway lines;

e) makes full use of the approach capacities of the existing four subway lines into the south-of-Bloor-Street area;

f) provides additional capacity to the Sherbourne Express bus route in the part of the Downtown north of Queen Street;

g) develops an existing surface transit route that already has an established relief function.

A criticism of the Bay LRT proposal might be that it is too close to the existing Yonge and University lines and that the University line already has spare capacity. In response, there appears nothing wrong with this arrangement of routes since these three lines all serve the areas of highest demand between Bloor and Front Streets and the Bay Street route extends transit service right down to the developing Waterfront and Railway Lands areas. Also, by 1991, which is the planning horizon of the ARTS study, the spare capacity on the University subway will largely be used up as growth on the Bloor and Spadina lines continues and increasing numbers of riders divert from the crowded Yonge line.

5.2 The Long-Term Regional Problem

It is felt that the surface transit improvements outlined above will accommodate Central Area employment growth until around the year 1995. By this point in time, it is expected that regional commuting problems, particularly from the north and west, will be the most pressing and that capacity problems on the Yonge subway north of Bloor could be a major concern. At this stage, there appear to be three principal options:

a) undertake substantial capital improvements on the subway to reduce headways and increase capacity on the Yonge-University-Spadina subway lines;

b) look to expanded GO-services to accommodate the growth in regional commuting;

c) invest in a Metro radial (not relief) line as described in the ARTS report. A radial line consists of the relief line extended northwards beyond Danforth Avenue to as far as Finch Avenue East.

With a commitment to surface transit improvements in the Central Area, speculative decisions among the three long-term options described above do not have to be made today. Additionally, amendments to the Metropolitan Toronto Official Plan can be deferred which, if processed now to permit additional, centrally oriented, rapid transit facilities, could threaten the policy of deconcentration.

However, to some extent, this discussion of long-term rapid transit options has already been opened up through the Province's recently announced plans for GO-transit expansion and in the TTC's report on headway reductions on the Yonge-University-Spadina (Y-U-S) subway system. It is perhaps worthwhile, even at this early stage, to pick up the discussion of some of the points raised in the TTC's December 8, 1982, report.

This report produced two major conclusions. First, modest increases in the capacity of the Y-U-S could be achieved at little cost by reducing current headways from 130 to 120 seconds. Secondly, to attempt to reduce headways further, below the two minute level, involves substantial capital costs.

The existing subway is designed to accommodate two-minute, minimum headways. The TTC report notes:

> "Through further operational changes including procedures that require additional manpower it is considered possible to reduce this (current 130 second) operational headway closer to the design headway, producing a capacity increase of 3,000 to 4,000 passengers per hour per direction" (p.2).

The TTC recommends that this headway reduction be pursued by the addition of two more trains per hour on the Y-U-S subway. This measure would provide an additional 6,000-8,000 passengers/hour capacity south of Bloor Street since the headway reduction applies to both the Yonge and University lines.

For a cost of between $255 m. - $335 m. (1982) headways on the Y-U-S could be reduced from the present 130 seconds interval (27.7 trains/hr.) to 100 second intervals (36 trains/hr) for a 30% increase in capacity or an additional capacity of 10,500 passengers per hour. Of this total cost figure, between $150 m. - $230 m. is for fixed expenditures and $105 m. is for additional subway cars which would be acquired as the demand arose.

In comparing this alternative to the relief line the TTC report concludes that "... this option does not seem cost-effective, since a new line, with a capacity of 20,000 to 25,000, could be built for about $400 million from Donlands to downtown". However, it should be noted first that, based on the ARTS figures, the relief line would cost around $380 m. to service a peak demand of 6,500 passengers per hour and to accommodate 20,000 passengers per hour extra vehicles would be required bringing the total cost up to around $450 m. Secondly, it is quesionable whether the relief line would ever attract 20,000 passengers per hour.

Also, the cost comparisons show that about a third of the cost of the Y-U-S headway reduction proposal is attributable to vehicle costs while for the relief line (at 6,500 passengers/hr.) only about one-tenth of the costs are attributable to vehicle requirements. This reflects the fact that the Y-U-S proposal is costed on the basis of reducing headways over the entire length of the line from Wilson Station to Finch Station and therefore requiring many more vehicles than the short relief line option.

The Y-U-S proposal should more properly be compared with the full radial line concept. The additional 10,500 capacity that the Y-U-S proposal adds is, in the long-term, effectively 21,000 since the reduction in headways applies equally to both the Yonge and University lines. More importantly for the long-term, the Y-U-S proposal increases capacity on both the Yonge and Spadina lines north of Bloor, where the relief line does not penetrate, and extends service to the north Metro boundary, one of the major areas of future commuting growth.

In this light, the Y-U-S headway proposal should be seen as an alternative to the $2,040 m. full radial line proposal of the ARTS study as a means of accommodating long-term commuter growth into the Central Area. Acknowledging the TTC's points that the Y-U-S proposal tends to "place all the eggs in one basket" on the existing system, it still appears worthy of greater consideration. Reduced headways, if they can be reliably maintained, will benefit existing and future users through reduced waiting times and provide additional capacity directly at the points of greatest congestion on the TTC system.

In relation to the more expensive surface transit proposals, it might be argued that if the radial line looks like a possible long-term option then why not build the relief line now as the first stage and at the same time solve the problem of relieving the Yonge line south of Bloor and avoid the expense of building redundant LRT lines. The present problem with the subway system is that four lines converge into two lines south of Bloor and a facility such as the Bay LRT can make better use of the approach capacity of the four lines to service employment growth south of

Bloor than can a relief line which simply connects Donlands Station on the Danforth line to Union Station. That is to say, as described above, the surface transit measures provide the most effective relief function to the Yonge line south of Bloor Street.

In the long-term, capacity problems on the Yonge line north of Bloor Street may arise and, at this stage, the radial line may present one option to the solution of this regional commuting problem. However, the value of the radial line has not yet been proven and building the relief line as a first stage represents a commitment to this particular long-term strategy which may prove unwarranted. However, even if at some point in the future the radial line is chosen as the best option to service long-term employment growth in the Central Area, the Donlands to Union Station section of this line will not render such facilities as the Bay LRT redundant as these surface transit measures will continue to play an important role in the local distribution of trips between the subway system and the area south of Bloor Street.

6. POLICY CONSIDERATIONS

The present pattern of regional trip growth is creating transit capacity problems in the Central Area. However, if approval is given at this time to the ARTS proposal for a $380 m. rapid transit relief line to solve these problems, then the City and Metro policies of supporting deconcentration could be seriously weakened. The Metropolitan Official Plan supports the development of major employment centres at North York City Centre and Scarborough Town Centre as an alternative to the continued concentration of development in the Central Area. Specifically, the Metropolitan Official Plan, which was approved in October, 1980, states in the following sections:

3.b.2 ... "The social and environmental impacts inherent in the continued reliance on a centrally oriented urban structure are no longer acceptable. It is necessary, therefore, to commence the long-term task of modifying the present structure."

and

6.B.2 Metro Council shall support "... improvements to the quality of service on the subway lines; but shall not support construction of additional rapid transit lines into the Central Area."

From these statements, it can be seen that the ARTS relief line proposal goes against both the letter and intent of the Metropolitan Official Plan and would require this plan to be

amended. If amended, the City's Official Plan is legally required to be brought into conformity with the Metropolitan Plan.

The conclusion of this report that relatively modest surface transit improvements, such as the introduction of a Bay LRT service, can provide sufficient transit capacity to service Central Area employment growth until around 1995 is of considerable relevance to the deconcentration issue. In the long-term, there may develop the need for major capital investments in improved transit services to the Central Area but decisions on this question do not have to be made immediately. In the meantime, consideration can be given to making investments in suburban transit lines, which support the policy of deconcentration, the next priority. Also, by deferring consideration of major transit investments serving the Central Area, further analysis of the emerging trends in trip growth can be undertaken and tested against actual experience. Certain issues, such as the development plans for the Waterfront and Railway Lands, which impact critically on the need for new Central Area transit services will then have reached greater resolution.

The relief line proposal contains both operational and policy risks in respect to its ability to provide effective relief to the Yonge line and the negative impact which it has on the policy of deconcentration. Under these circumstances, the surface transit improvement strategy outlined above, which provides the Yonge line relief function and defers the need for decisions on major long-term transit improvements to the Central Area, has considerable appeal.

7. CONCLUSIONS

It is acknowledged that the present crowding on the Yonge subway line south of Bloor Street will be aggravated by further employment growth in the Central Area and Waterfront unless corrective action is undertaken. Although in the short-term there will be a need to provide relief to the Yonge line south of Bloor, in the longer term the projected pattern of regional trip growth is expected to create regional capacity problems, particularly from the high population growth areas of Peel and York regions, which could lead to crowding problems on the Yonge line north of Bloor.

In regard to providing short-term relief to the Yonge line south of Bloor Street, it is the position of this report that surface transit improvements can provide such a relief function more cost-effectively than the rapid transit relief line proposed in the ARTS study. A combination of the Sherbourne Express bus, Bay LRT and Spadina LRT surface transit proposals, along with introduction of 120 second headways on the Yonge-University subway lines,

appear to provide adequate relief to the Yonge line south of Bloor Street and afford sufficient capacity to handle Central Area and Waterfront growth till around the year 1995.

Solutions to possible long-term (post 1995) regional commuting problems appear to rest in such options as expanded GO-transit services, reduced headways on the Yonge-University-Spadina line and the ARTS radial line proposal. However, the final choice between these long-term options does not have to be made now. In the meantime, a better understanding of the transit problems that are likely to be confronted in the 1990's can be gained without the loss of any current options for long-term solutions.

The surface transit improvements and subway headway reductions recommended in this report are consistent with current Metropolitan and City Official Plan policies. These improvements are relatively inexpensive and enable transit investment funds to be made available for suburban transit line proposals that directly support the Metro policy of deconcentration should these be determined as the next rapid transit priority.

Recommendations:

1. That City Council endorse protecting the option for a radial line as a long-term contingency measure to deal with the future (post 1995) possibility that additional TTC capacity will be required to serve the Central Area and that this option be evaluated in conjunction with the other, long-term TTC alternative of reducing headways on the subway to increase arterial transit capacity into the Central Area; and further, that the concept of the relief line, as put forward in the "Accelerated Rapid Transit Study", as a means of relieving congestion on the Yonge subway south of Bloor Street, not be endorsed.

2. That City Council authorize the Commissioner of Planning and Development, in consultation with the Commissioner of Public Works, to prepare for Council's approval terms of reference and cost estimates for a consultant study of the Bay Street Light Rail Transit (LRT) proposal outlined in Section 5.1 of this report for presentation to the Toronto Transit Commission.

3. That City Council endorse the recommendation of the TTC's December 8, 1982, report to pursue steps to increase the capacity of the Yonge-University-Spadina subway by the addition of two rush-hour trains to this route.

4. That City Council affirm its general support for the introduction of transit priority measures on Downtown surface

routes which will provide effective relief for the Yonge Subway line.

5. That City Council specifically re-affirm its support for the introduction of the Sherbourne Express bus service as originally proposed by the TTC in September, 1982, and indicate its willingness to consider favourably further transit priority measures on this route, such as reserved bus lanes and signal pre-emption, should ridership growth on this service indicate that such measures would be operationally justifiable.

6. That this report be transmitted, for information, to the Toronto Transit Commission, the Corporation of Metropolitan Toronto, the Area Municipalities, the Regions of Halton, Peel, York and Durham and the Provincial Ministry of Transportation and Communications.

Stephen G. McLaughlin,
Commissioner.

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